EXHIBIT D

SUPPLEMENTAL EXPERT REPORT OF DR. JEFFREY B. LIEBMAN

April 3, 2019

I. EXECUTIVE SUMMARY

1. The communities of Cuyahoga County and Summit County, Ohio (the "Communities") are in the midst of a public health emergency due to the growth in the use of prescription opioids and the harms resulting from such use.[1] Thousands of residents have died; hundreds of infants have suffered the ill effects of neonatal abstinence syndrome; families have been separated due to the struggles with addiction; and neighborhoods have declined.[2] The need to respond to opioid-related social harms have diverted public sector resources from other valuable purposes while still leaving many harms unaddressed.[3]

2. I have been asked to present opinions related to (i) identifying how the Communities can best utilize the tools and practices available to implement programs aimed at furthering the communities' efforts to ameliorate and abate the crisis they face; and (ii) estimating the cost of providing these services.

3. Making rapid and deep progress in these two communities will require both a substantial increase in resources and effective coordination of those resources. As set forth in the Expert Report of Dr. Caleb Alexander, a community opioid abatement plan has many components, including initiatives to reduce opioid oversupply and encourage safe opioid use; and to identify and treat individuals with Opioid Use Disorder (OUD). Here I propose an Abatement Plan for the Cuyahoga and Summit communities, which includes measures to achieve the goals discussed by Dr. Alexander. The components of the Abatement Plan outlined below can be summarized in the following four categories: Treatment; Harm Reduction; Primary Prevention; and System Coordination.

- **Treatment** includes additional capacity for detoxification, inpatient and outpatient therapy, recovery housing, and medication-assisted treatment (or MAT), resources for

[1] *See* T. Gilson Deposition Tr. 176:14-178:12; A. Vince Deposition Tr. 186:6-187:7.

[2] I understand that the Expert Report of Jonathan Gruber documents the growth in opioid shipments in the last two decades, the relationship between this growth and opioid-related mortality, and how the initial growth from the mid 1990's to 2010 precipitated the rapid growth in illicit opioid mortality in recent years. I further understand that the Expert Report of David Cutler further documents the impact of defendants' misconduct on social harms including mortality, crime, and the demand for foster care services.

[3] I understand that the Expert Report of Thomas McGuire on damages estimates the costs faced by Bellwether governments due to the opioid crisis.

better connecting individuals to treatment services, and targeted interventions with high priority populations – those in jail, families in the child welfare system, and opioid-using pregnant women and new mothers.

- **Harm reduction** includes distributing naloxone, resources for needle exchange, and interventions to treat and reduce the spread of HIV and hepatitis C among intravenous drug users, as well as the provision of housing support for vulnerable populations that have high rates of opioid use.
- **Primary prevention** includes media campaigns to reduce opioid use and misuse and decrease the stigma of seeking treatment, school-based prevention programs, resources for law enforcement, drug disposal programs, and medical provider education.
- **System coordination** involves data collection and surveillance to track the evolution of the epidemic in the communities so that resources can be efficiently deployed to their most effective use, staffing to coordinate the overall effort so that the different pieces of the plan work effectively together, and resources for law enforcement so that individuals can be more effectively connected to services and appropriate supervision.

4. The types of programs and services that fall into each of these categories, as well as recommended elements of such programs and services, are described in further detail in the Expert Reports of Dr. Alexander, Dr. Theodore Parran, and Dr. Anna Lembke. As noted by Dr. Alexander, while there are many elements of an opioid-related abatement program, there is not a one-size fits-all approach to abating the problem in all communities. As set forth in my opinions below, this report focuses on and sets forth the scope of the programs and services recommended in the Abatement Plan for the Cuyahoga and Summit communities and ultimately the costs of efforts required to abate the opioid crisis in these communities.

II. QUALIFICATIONS

5. I am the Malcolm Wiener Professor of Public Policy at the Harvard Kennedy School, where I direct the Taubman Center for State and Local Government as well as the Government Performance Lab (GPL).

6. I received a Ph.D. in Economics from Harvard University in 1996. I have published numerous peer-reviewed journal articles, essays, and book chapters. I teach courses on the Economic Analysis of Public Policy, American Economic Policy, and Government Turnarounds. I specialize in Public Finance and Health Economics as well as state and local government policies. My research focuses on tax, budget, and health policy, impact evaluations of social programs, and strategies for making government social service agencies more effective. My CV is included as Appendix A.

7. I have twice served in government. From 1998-1999, I was Special Assistant to the President for Economic Policy and coordinated the National Economic Council's Social Security reform technical working group. From 2009 to 2010, I worked at the Office of Management and Budget, first as Executive Associate Director and Chief Economist and then as Acting Deputy Director. In both periods of government service, I supervised the development of cost estimates of complicated multi-faceted government initiatives, including Social Security reform, the American Recovery and Reinvestment Act of 2009, and the Affordable Care Act of 2010.[4]

8. The Government Performance Lab (GPL) at the Harvard Kennedy School, which I founded in 2011 and direct, provides pro bono technical assistance to state and local government agencies, mostly social service agencies, to help them improve the results they achieve for their residents. We help agencies undertake performance improvement projects by embedding recent graduates of public policy, law, and business schools in government agencies, typically for 18-24 months.

9. To date, GPL has undertaken close to 100 projects in more than 30 states. These projects include providing assistance in the areas of behavioral health and homelessness,

[4] American Recovery and Reinvestment Act of 2009: Law, Explanation and Analysis: P.L. 111-5, as Signed by the President on February 17, 2009. Chicago, Ill.: CCH, 2009; United States. Compilation Of Patient Protection and Affordable Care Act: as Amended through November 1, 2010 Including Patient Protection and Affordable Care Act Health-Related Portions of the Health Care and Education Reconciliation Act of 2010. Washington: U.S. Government Printing Office, 2010.

criminal justice, education and jobs, and children and families. We currently have 40 employees, nearly all embedded in state, city, and county agencies around the country.[5]

10. A significant share of GPL's work has involved substance use issues. For example, we worked with the states of Connecticut and Florida to develop systems to better connect parents in their child welfare systems with substance use treatment. We have worked with Denver, Colorado and the Commonwealth of Massachusetts on identifying chronically homeless individuals with complicated mental health and substance use challenges and prioritizing them for supportive housing. We worked with the Louisville, Kentucky Metro Jail on an initiative to connect releasees to substance use treatment. We worked with Bernalillo County, New Mexico (Albuquerque), on how to most effectively spend the resources from a new behavioral health levy to combat addiction and other behavioral health challenges.[6]

11. I am being compensated on an hourly basis for my work on this matter at a rate of $900 per hour and $1,000 per hour for any deposition or trial testimony I am required to provide. I am also being reimbursed for my out-of-pocket expenses. My compensation does not depend on the outcome of the case or the substance of my opinions.

12. The opinions and conclusions in this report are based on information and documentation available to me at this time, and I reserve the right to supplement and revise the opinions and conclusions expressed in this report based on additional evidence or information provided to me after the date of this report. The materials I considered in preparing my analysis and forming my conclusions are attached as Appendix B.

III. SUMMARY OF OPINIONS

13. In this report I present the following opinions and describe the evidence and analysis related thereto:

14. I conclude that there is a framework within the area of applied economics by which an economist can reasonably evaluate (a) the level of abatement resources needed for the next 15 years in the communities of Cuyahoga County and Summit County, Ohio, to abate the

[5] A full list of the projects I have overseen by jurisdiction is set forth at https://govlab.hks.harvard.edu/projects and listed in Appendix E.

[6] Id.

opioid crisis and (b) the cost of those resources. In particular, an economist can use data regarding the target populations and their service needs as well as community input and the opinions of other medical and epidemiological experts to develop the scope of programming needed in order to address the opioid crisis in these communities. As discussed further below, the economist can utilize standard and widely accepted tools of empirical economic analysis and public sector budgeting, as informed by professional experience and judgment, to estimate the costs of providing this programming.

15. My analysis estimates the cost of abatement programming required from 2020-34 to abate the harms in the two communities resulting from the opioid crisis. The economic literature on public health recognizes that it is not realistic to assume that health policies will help all affected individuals -- even the best designed policies will not be successful in reaching every member of a target population, and some addicted individuals will choose not to receive treatment when available.

16. Instead, the analysis attempts to estimate the costs to implement a policy based on a feasible and realistic view of what can be achieved. Estimates of the cost of treatment -- the largest component of cost under the Abatement Plan -- are based on the view that, even with intensive expansion of resources, the number of individuals with opioid use disorder (OUD) who receive treatment (currently about 20 percent of the OUD population) will double to 40 percent, and the number of individuals who currently receive Medication Assisted Treatment, roughly seven percent of the OUD population, will quadruple to 27 percent. These projections are discussed further below.[7]

17. As discussed further below, the Abatement Plan identifies four major area of needed services: treatment programs, harm reduction programs, prevention programs, and system coordination efforts. Several specific programs are identified in each category (see Figure 1). This report presents costs estimates for seven major programs which are expected to account for a large portion of the program costs. I intend to supplement this report with cost estimates for the remaining programs after reviewing information recently provided in discovery

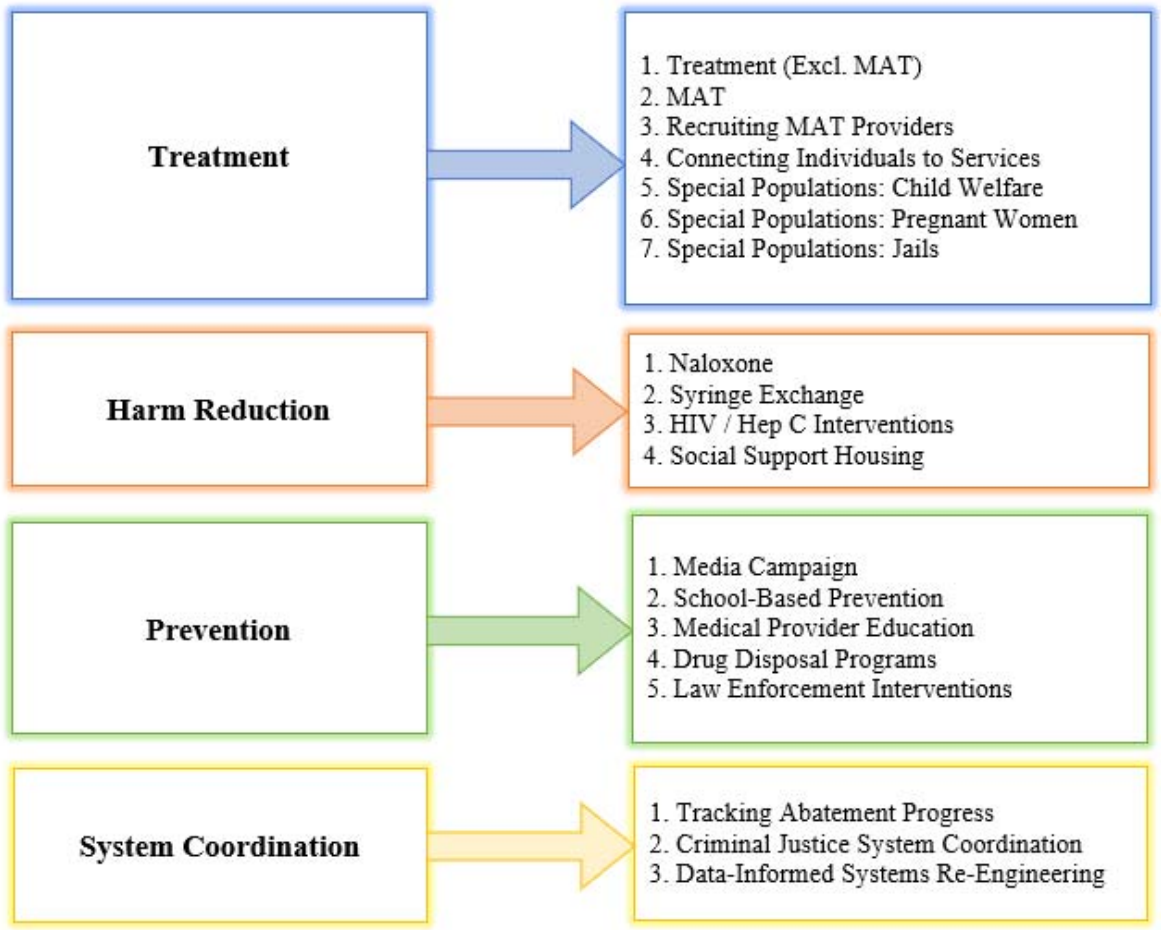
[7] My estimates of plan costs are not reduced to reflect costs arising in connection with heroin use in the community where the individual had never used prescription opioids.

and related information. My analysis does not address how abatement costs should be shared among various entities or parties.

Figure 1

Elements for the Community Abatement Strategy

Cuyahoga and Summit Counties



18. Based on my study of the abatement needs of the Cuyahoga and Summit communities and application of the methodologies and analysis described in this report, I estimate that implementation of the programs of Abatement Plan evaluated to date will cost $5.0 billion in Cuyahoga County and $2.2 billion in Summit County over the next 15 years. These totals reflect estimates of the largest categories of costs currently faced by the Cuyahoga and Summit Communities in abating the opioid crisis as well as estimates of additional costs needed to make greater progress in abating opioid disorders. In addition, I am informed that the costs of

certain services contemplated in the Plan have been or will be provided in documents or testimony from the Counties. To the extent that the costs of additional elements of the Plan are required, I am prepared to supplement this Report. Estimates of the annual elements of the costs of each of these programs for which costs have been estimated and the sources of the data used in developing these estimates are reported in an appendix to this report.[8] I understand other expert reports also discuss the effectiveness of these interventions at reducing mortality and morbidity associated with opioid addiction.[9]

19. Available studies indicate that an intensive effort like the one described in this plan is needed to address the problems faced in these communities because of the opioid epidemic and further indicate that implementation of such a range of programs will result in reduced mortality and morbidity associated with opioid addiction.[10]

20. Because it is possible that the epidemic will evolve in ways that either reduce or increase the need for resources relative to my primary estimates, it is appropriate for me as an economist to provide a range of estimates for lower cost and higher cost scenarios.[11] It is also important to build in feedback mechanisms into the Abatement Plan, so that the level of abatement resources and the allocation of those resources can be adjusted over time as new information about needs becomes available.

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[8] The Abatement Plan provides estimates for certain of the largest resource needs in these communities. In particular, and as set forth in Tables 1 and 2 below, costs are estimated for the following categories: treatment, MAT, recruiting providers to administer MAT, naloxone, the syringe exchange program, a mass media campaign, and school-based prevention. In addition, I am informed that the costs of certain services contemplated in the Plan have been or will be provided in documents or testimony from the Counties. To the extent that the costs of additional elements of the Plan are required, I am prepared to supplement this Report.

[9] I understand that these are discussed in the Expert Reports of Anna Lembke, Caleb Alexander, and Katherine Keyes.

[10] Pitt, Allison L., Keith Humphreys and Margaret L. Brandeau. "Modeling Health Benefits and Harms of Public Policy Responses to the US Opioid Epidemic." AJPH Open Themed Research Vol. 108 no. 10 (Oct 2018): 1394-1400. Pitt, et al. conclude that "[p]olicies that focus on services for currently addicted people provide health benefits immediately without causing harm. However, no epidemic has ever been averted solely by treating single affected cases. Instead, portfolios of policies will likely be required, including those that prevent addiction, treat addiction, and mitigate its effects." (at 1399).

[11] As an example, see the range of projections of future opioid deaths presented in M. Blau, "STAT forecast: Opioids could kill nearly 500,000 Americans in the next decade," https://www.statnews.com/2017/06/27/opioid-deaths-forecast (June 27, 2017).

21. The rationale and justification for these opinions are set forth in more detail in the remainder of this report.

IV. BACKGROUND ON THE OPIOID EPIDEMIC IN CUYAHOGA AND SUMMIT COUNTY AND UNMET NEEDS

22. The nationwide opioid epidemic is hitting the Cuyahoga and Summit communities particularly hard. The Cuyahoga County Opiate Task Force has estimated that as of 2016, 73,200 Cuyahoga residents misuse or abuse prescription opioids each year in the county and that 20,562 of them make the switch to heroin each year.[12] Opioid-related overdose deaths in Cuyahoga County increased from 93 in 2005; to 191 in 2012; to 524 in 2017 as the use of Fentanyl spread.[13] In Summit County, the number of opioid-related overdose deaths rose from less than 20 in 2005 to 60 in 2012 to 190 in 2017.[14] I understand that the Expert Report of Jonathan Gruber documents that the per capita overdose death rate in Cuyahoga County is among the highest county-level rates in the nation. And these mortality rates understate the true magnitude of opioid-related health risks since many additional individuals overdosed but were saved by application of opioid antagonists such as naloxone by first responders. The Cuyahoga medical examiner reports that nearly 900 people were saved in Cuyahoga county through project DAWN (Deaths Avoided with Naloxone) in 2017.[15]

23. Hundreds of children are being adversely affected by the opioid crisis in both communities. Between 2013 and 2017, Summit County reported 426 hospitalizations due to neonatal abstinence syndrome (NAS) and Cuyahoga County reported 629.[16] In 2017 alone, Summit County reported 79 hospitalizations due to NAS in 2017; Cuyahoga County reported 137 NAS hospitalizations.

24. As discussed further below, obtaining information about local conditions and service gaps from local experts is a key element in the design of government policy and is a

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[12] Cuyahoga County Opiate Task Force Report, 2016.
[13] Source: Multiple Causes of Death Data, accesses on CDC Wonder.
[14] Source: Multiple Causes of Death Data, accesses on CDC Wonder.
[15] Cuyahoga County Medical Examiner's Office, Heroin/Fentanyl/Cocaine Related Deaths in Cuyahoga County, http://medicalexaminer.cuyahogacounty.us/pdf_medicalexaminer/enf-US/HeroinFentanylReports/090718-HeroinFentanylCocaine-ME-report-Aug.pdf (Sep. 17, 2018), p. 5.
[16] Source: https://odh.ohio.gov/wps/wcm/connect/gov/4cad708c-ba99-4b8b-b425-01cfef119c5d/2017+NAS+County+Table+12.3.2018.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0JO00QO9DDDDM3000-4cad708c-ba99-4b8b-b425-01cfef119c5d-muueFzr

standard element in the framework used in GPL projects. In the initial phase of this project, I had extensive conversations about opioid-related issues with local government officials, law enforcement officials, medical practitioners, and social service provides. A list of individuals interviewed in the process is attached as Appendix C. Each of these individuals stressed that needs for opioid-related services often go unmet due to the limitations of available resource and related obstacles to providing opioid-related services. This section briefly summarizes some observations based on these conversations, information provided in response to these conversations, and transcripts of depositions of community members. My abatement plan takes into account the information I learned in these interviews.

25. My discussions with local law enforcement officials indicated that EMS, police, and fire department resources are being diverted from other activities in order to respond to opioid overdoses. The Cleveland Police Department reports that officers who previously were assigned to disrupting the operations of drug dealers now spend all of their time investigating overdose deaths. [17]

26. While additional treatment resources have been added, there is neither enough treatment capacity nor sufficient coordination to connect individuals who need treatment for opioid addiction to get services. In addition, in Summit County, the director of the ADM Board reports that only about 20 percent of individuals with overdose deaths had previously received services and that their working assumption is that only 10 percent of the people needing help get it. [18] The Summit Opioid Task Force reports wait times of 26 days for residential treatment. [19] However, local experts also note that people can only be put on wait lists for services after they have had their need assessed, and if there were a sufficient number of assessors, the waiting lists for treatment would appear much greater. [20] Lack of 24-7 access to treatment misses the often-narrow window of opportunity when a person may be open to entering treatment, for example after an overdose.

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[17] Deposition of Gary Gingell, November 20, 2018, pp. 237, 175-176.

[18] Call with G. Craig of Summit County Alcohol, Drug Addiction & Mental Health Services Board, July 3, 2018.

[19] Summit County Opiate Task Force, Key Stakeholders Annual Meeting, Meeting Notes 6/25/2018 (SUMMIT_ 001164135), at p. 2.

[20] Comment by D. Skoda at Round-table Meeting with Representatives of the Summit County Community, July 11, 2018.

27. Based on this review and my experience as an economist and policy analyst, significant needs in the Cuyahoga and Summit Communities are currently going unmet and significant additional resources are required in order to meet the demand for opioid-related services.

V. FRAMEWORK AND METHODOLOGY

28. As noted above, the development of the Abatement Plan for the Cuyahoga and Summit Communities and estimation of the funding needed for this plan applies the general methodological framework used in my prior analysis of government programs, in my academic and government work, as well as in the nearly 100 projects that have been implemented under my direction at the GPL. My framework follows the standard approaches used by the Congressional Budget Office[21], the President's Office of Management and Budget[22] and the Government Accountability Office[23] in estimating costs and projecting budgets.

29. To estimate the cost of implementing the Abatement Plan, I first gathered qualitative information about the need for opioid-related services in the Cuyahoga and Summit communities, including assessments of the populations in need of services, existing infrastructure and service gaps, and information on the contours and severity of the epidemic. This initial information gathering phase of my analysis involved meetings and phone calls with community members involved in addressing the opioid crisis, including medical service providers, social service providers and individuals in government. Information gained in this review helped to identify the services needed in the Cuyahoga and Summit communities, the extent to which services can be expanded, the length of the "ramp up" period, and the length of time for which services are likely to be needed.

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[21] Congressional Budget Office, "How CBO Prepares Cost Estimates," (February 2018) (https://www.cbo.gov/system/files/115th-congress-2017-2018/reports/53519-costestimates.pdf)

[22] Executive Office of the President, Office of Management and Budget, "Circular No. A-11, Preparation, Submission and Execution of the Budget," (June 2018).

[23] Government Accountability Office, "GAO Cost Estimating and Assessment Guide," (March 2009) (https://www.gao.gov/new.items/d093sp.pdf)

30. Second, I have collected data measuring the extent of the opioid crisis and current response efforts in the Cuyahoga and Summit communities. This has included the review of public data on the extent of OUD; analyses on the quality and reliability of available OUD data; and information on OUD treatment programs in these communities. This analysis has also included efforts to estimate the costs of opioid treatment, harm reduction, prevention, and system coordination.

31. Finally, I have reviewed the published literature on remedies to the opioid epidemic, on the effectiveness of proposed interventions, and on the experience of other communities that have adopted similar interventions. [24]

32. As noted, the approach of identifying the target population, assessing population needs, selecting the set of programs that can best meet these needs, and then estimating the costs of providing the programming is widely applied in public economics and policy analysis. Evaluating community needs based on quantitative data and then verifying the estimates based on information obtained from local experts is also standard practice. Analysis of related topics such as program design and implementation, budgeting, and forecasting are central to the curriculum at the Harvard University's Kennedy School of Government where I teach courses in the "Economic Analysis of Public Policy" and "Government Turnarounds" which directly relate to these topics. As GPL's name suggests, setting performance-based goals for projects and implementing on-going monitoring and continuous improvement efforts to enable projects to meet their goals is a significant part of the Lab's work and has been a primary emphasis of the projects that I direct there. Policy design and evaluation also requires the exercise of

[24] Examples of the literature reviewed include: Centers for Disease Control and Prevention, *Evidence-Based Strategies for Preventing Opioid Overdose: What's Working in the United States.* 2018. Brooklyn, Johan and Stacey C. Sigmon, "Vermont Hub-and-Spoke Model of Care For Opioid Use Disorder: Development, Implementation, and Impact," *Journal of Addiction Medicine* 2017, 11(4): 286-292. Hernandez, Yamilette et al., "How Massachusetts, Vermont, and New York are Taking Action to Address the Opioid Epidemic," *American Journal of Public Health*, 2018, 108:12, 1621-1622. U.S. Department of Health and Human Services (HHS), Office of the Surgeon General, *Facing Addiction in America: The Surgeon General's Spotlight on Opioids.* Washington, DC: HHS, September 2018. National Academies of Sciences, Engineering, and Medicine. 2017. *Pain management and the opioid epidemic: Balancing societal and individual benefits and risks of prescription opioid use.* Washington, DC: The National Academies Press.

professional judgement, which I have developed over the past 22 years in undertaking related types of analyses.

VI. OVERVIEW OF ABATEMENT PLAN

A. Origins of the Abatement Plan

33. Communities around the U.S. that are showing incipient progress in reducing opioid use and opioid deaths have followed a common set of strategies. They have increased the availability of treatment, including MAT. They have reduced obstacles that prevent individuals from obtaining access to the available treatment. They have invested in harm reduction, increasing access to naloxone and fentanyl test strips to prevent deaths among those still misusing opiates and taking steps to minimize the spread of HIV and Hepatitis C among heroin users. They have invested in primary prevention to reduce the number of individuals that newly develop Opioid Use Disorder. They have put resources into system coordination so that new developments are tracked and quickly responded to, resources are allocated effectively, and the rate of individuals falling through the cracks because of failed handoffs is minimized.

34. The Abatement Plan outlined and evaluated in this report builds on approaches that have been implemented in other areas and shown to be effective.[25] The Abatement Plan also builds on abatement strategies currently being developed in the Cuyahoga and Summit communities.

35. For example, in February – March 2018, Summit County convened a group of government and other stakeholders in the County to identify resources, gaps, and barriers in the existing systems for responding to the opioid crisis.[26] The group also aimed to better meet treatment needs of adults with opioid addiction in contact with the criminal justice system. At this meeting, results of a recent Sequential Intercept Mapping (SIM) exercise were presented,

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[25] See, for example: Centers for Disease Control and Prevention, Evidence-Based Strategies for Preventing Opioid Overdose: What's Working in the United States. 2018; U.S. Department of Health and Human Services (HHS), Office of the Surgeon General, Facing Addiction in America: The Surgeon General's Spotlight on Opioids. Washington, DC: HHS, September 2018. National Academies of Sciences, Engineering, and Medicine. 2017. Pain management and the opioid epidemic: Balancing societal and individual benefits and risks of prescription opioid use. Washington, DC: The National Academies Press.

[26] See Summit County, Sequential Intercept Mapping and Action Planning for Opioid Epidemic Response, March 20, 2019 (SUMMIT_000349556).

which provided a comprehensive picture of how people with substance use disorders and co-occurring disorders flow through the Summit County criminal justice system, including six "intercept points" and an action plan. [27] The Abatement Plan adds resources at many of these intercept points to better connect individuals in need of opioid use treatment and other services to these services and implements many of the types of programs recommended in the mapping exercise.

36. Similarly, the Cuyahoga County Opiate Task Force has proposed and implemented a number of strategies to combat the opioid epidemic in conjunction with its partners, including, but not limited to: (1) increasing naloxone accessibility to the community by making the reversal kits available through pharmacies and Project DAWN locations; (2) educating local law enforcement on the benefits of carrying naloxone; (3) participating in bi-annual drug take-back days; (4) establishing medication drop boxes; (5) expanding substance use disorder services in MetroHealth emergency departments; (6) providing Safer Opioid Prescribing town hall trainings for prescribers; and (7) targeted media campaigns for heroin/fentanyl prevention and awareness.[28] The Abatement Plan incorporates and expands on many of these programs.

37. Furthermore, in their planning exercises, the Cuyahoga and Summit communities have recognized the need for improved coordination of systems to expand access to MAT. One of the tools for accomplishing this the Hub-and-Spoke Model, described in the Alexander Report, and previously implemented in Vermont.[29] The Hub-and-Spoke model uses a limited number of specialized, regional addictions treatment centers (called "hubs") that collaborate with dispersed providers spread elsewhere in the community (called "spokes"). The hubs provide intensive treatment to patients and consult with medical providers treating patients in the general

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[27] The six intercept points identified are Prevention/Treatment/Regulation, First Contact and Emergency Services, Initial Detention/Initial Court Hearings, Jails and Courts, Reentry, and Probation/Community Supervision.

[28] See Cuyahoga County Board of Health, "2018 Injury Prevention Report," available at http://opiatecollaborative.cuyahogacounty.us/pdf_OpiateCollaborative/en-US/2018AnnualReport.pdf, pp. 2-3, 7; Cuyahoga County Opiate Task Force Report 2016, available at http://www.ccbh.net/wp-content/uploads/2017/07/2016-CCOTF-Annual-Report.pdf, at pp. 4, 5.

[29] Brooklyn, Johan and Stacey C. Sigmon, "Vermont Hub-and-Spoke Model of Care For Opioid Use Disorder: Development, Implementation, and Impact," Journal of Addiction Medicine 2017, 11(4): 286-292.

practice spokes. Under this model, each MAT patient has an established hub, a single MAT prescriber, a pharmacy home, access to a general practice provider who are the medical community, and nurses and clinicians at spoke locations. The approach helps avoid coordination problems resulting from state and federal regulations that limit the ability of providers to offer different forms of MAT (e.g., methadone, buprenorphine, and naltrexone), and facilitates the provision of counselling and related services.

B. Elements of the Abatement Plan

38. As summarized in Figure 1 above, there are four elements of the Abatement Plan:

- Treatment for individuals with OUD
- Harm reduction, including widespread distribution of naloxone and resources for syringe exchanges;
- Primary prevention programs, including media campaigns, school-based prevention programs, and expanded resources for law enforcement; and
- System coordination to track the evolution of the epidemic, coordinate the different pieces of the abatement effort, and improve handoffs between the medical and criminal justice systems.

39. The remainder of this section briefly describes the key elements of the plan. Additional details of the Abatement Plan, including the parameters used in projecting costs, are presented in Appendix D, which presents the cost calculation and identifies the supporting data.

C. Overview of Treatment Services Under Abatement Plan

40. Treatment elements of the Abatement Plan include the provision of treatment services, such as detoxification, inpatient and outpatient therapy, recovery housing, and medication-assisted treatment (or MAT), resources for better connecting individuals to treatment services, and targeted interventions with high priority populations – those in jail, families in the child welfare system, and opioid-using pregnant women. Each of these is briefly addressed in turn.

1. Treatment Services: Non-MAT

41. The American Society of Addiction Medicine (ASAM) identifies the range of services a community needs to provide to appropriately treat addiction and substance-related disorders. These include services for managing withdrawal and related symptoms as well as the provision of a range of psychological counselling and support services. The Abatement Plan would expand the range and scale of services available in the Cuyahoga and Summit communities, including detoxification, residential, partial hospitalization, intensive outpatient, outpatient, recovery housing, and treatment facilities for parents with children.

42. Estimates of the cost of providing treatment services (other than MAT), including the costs of the facilities, under the Abatement plan are summarized in Appendix D, Tables C.1 and S.1 in Appendix D. The cost estimates anticipate that the number of individuals that receive treatment will ramp up over four years such that the number of individuals receiving treatment for OUD will double between 2020 and 2023.[30] I understand that the Expert Report of Anna Lembke explains that an effective Abatement Plan could expand its reach in this way by 2024.

2. Treatment Services: MAT

43. A central element of the Abatement Plan is to increase patient access to MAT including buprenorphine, methadone and naltrexone, as part of the broader treatment program. Estimates of the cost of providing MAT need to recognize that not all individuals with OUD will avail themselves of such programs and that it will take some time to equip enough providers with the capacity to offer expanded services. Program costs are estimated under the assumption that the share of individuals in treatment that receive MAT will increase from one-third to two-thirds within four years. Available evidence indicates that some individuals will need to receive MAT for many years and that rates of relapse and return to MAT are high so resources will be required through at least 2034 to ensure that patients continue to have access to MAT.

44. The cost estimates anticipate that the number of individuals who receive MAT in the Communities will expand over the next four years from approximately seven percent of the

[30] I assume that in 2020, 20% of individuals with OUD receive treatment in the Cuyahoga and Summit communities, based on the available data on treatment prevalence for individuals with OUD. See for example, SAMHSA/HHS: An Update on the Opioid Crisis, March 14, 2018 at p. 2: "Only 20% with OUD received specialty addiction treatment."

OUD population currently to approximately 27 percent. I understand that the Expert Report of Anna Lembke explains that an effective Abatement Plan could expand its reach in this way by 2024.

45. Estimates of the cost of providing MAT services under the plan are summarized in Appendix D Tables C.2 and S.2.

3. Recruiting Treatment Providers

46. The State of Ohio reports that "Ohio's existing prescriber workforce is inadequate to meet the MAT need," with only two percent of the physician workforce licensed to prescribe buprenorphine, and "most of these physicians are believed to be in the behavioral health field, which means that patients would have limited access to MAT through other physician practices like primary care . . ."[31] A study of Ohio specialty treatment organizations found that half reported insufficient prescribing capacity.[32] Lack of primary care physicians willing and equipped to manage patients receiving MAT is a major barrier to a successful "hub and spokes" model where specialty facilities manage patients through acute stages of their care and then hand patients off to primary care providers to manage the longer-term chronic phase of care.

47. In order to achieve the increased treatment levels described above, additional staff is needed to recruit primary care providers to obtain DEA licenses and become MAT providers. The Abatement Plan calls for funding of six full time nurse practitioners in Cuyahoga and Summit Counties to perform these services.

48. This estimate is presented in Appendix D, Tables C.3 and S.3.

4. Connecting Individuals to Services

49. As discussed above, it can be hard to coordinate treatment for opioid use disorder in Cuyahoga and Summit counties. Many of the hospital emergency departments lack the staff

[31] Ohio Department of Mental Health and Addiction Services, Workforce development as Part of the 21st Century Cures Act.

[32] Todd Molfenter, Carol Sherbeck, Mark Zehner, and Sandy Starr. Buprenorphine Prescribing Availability in a Sample of Ohio Specialty Treatment Organizations, J. Addictive Behav, Ther. Rehabil. 2015 4(2).

necessary to connect overdose patients to treatment. Treatment can be difficult to access outside of business hours, and there is a lack of resources to transport people to treatment.

50. The Abatement Plan includes staffing for a 24 hour a day / 7 days a week treatment connector hot line that could receive calls from individuals seeking treatment and from family members, emergency responders, or medical professionals trying to connect individuals to treatment services. It also includes resources to staff each major hospital emergency departments with social workers and recovery coaches who can connect individuals with substance use disorders to treatment. The Abatement Plan anticipates that new staff members will be required in Cuyahoga and Summit Counties to connect individuals to services. The plan also includes resources to pay for transportation to treatment sites for individuals who do not have a car.

51. The final component of "connections to services" is an expansion of web-based referral capacity. Research has shown that some individuals are more comfortable learning about treatment options and enrolling in treatment online rather than via a phone call or in person conversation.

52. Estimates of the costs of connecting individuals to services and treatment are summarized in Appendix D, Tables C.4 and S.4.

5. Special Population: Child Welfare

53. The United States Department of Health and Human Services (HHS) concluded that parental "[s]ubstance use, including opioid misuse, has downstream effects on children's welfare and family stability, and these in turn can place a substantial burden on communities."[33] The HHS report further found that counties with higher rates of drug overdose deaths and drug-related hospitalizations also have higher child welfare caseload rates and that substance use related cases are associated with more complex and severe child welfare cases.[34]

54. The Abatement Plan provides the following resources for child welfare-involved families:

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[33] ASPE Research Brief, US Department of Health and Human Services, "The Relationship between Substance Use Indicators and Child Welfare Caseloads," Revised March 9, 2018, p. 7.

[34] ASPE Research Brief, US Department of Health and Human Services, "The Relationship between Substance Use Indicators and Child Welfare Caseloads," Revised March 9, 2018, p. 1.

- Additional social workers to allow smaller caseloads for case workers managing complex cases involving substance abuse;
- Family advocates – peer coaches who have themselves recovered from substance use -- to assist parents in addressing their addictions;
- A trauma counselor in each community to provide services and advice to staff members at the Divisions of Children and Family Services who are managing cases in which parents or caregivers have died from drug overdoses.;
- Additional employees in Cuyahoga and Summit Counties to recruit foster families for placements of children affected by the opioid epidemic.
- Boarding costs for the placement of affected children in foster care.

55. Estimates of the abatement costs associated with child welfare services are summarized in Appendix D, Tables C.5 and S.5.

6. Special Populations: Pregnant Women

56. Prenatal exposure to drugs, and opioids in particular, have been an increasing issue in Ohio and in the Cuyahoga and Summit Communities. In 2016 alone, nearly 2,200 mothers in Ohio had an opioid drug abuse or dependence issue at the time of delivery.[35] Between 2013 and 2017 nearly 630 infants in Cuyahoga County and nearly 420 infants in Summit County were hospitalized due to Neonatal Abstinence Syndrome (NAS) resulting from exposure to opioids and other drugs in utero.[36]

57. In addition to the treatment alternatives described above, the Abatement Plan provides resources for a maternal-infant home visiting program that provides specially trained nurses to regularly visit with new mothers and mothers-to-be with opioid use disorder to provide coaching on health and parenting, including substance use treatment.[37]

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[35] 2017 Ohio Neonatal Abstinence Syndrome Report, available at https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/violence-injury-prevention-program/media/nas-datatable-2017.

[36] 2017 Ohio Neonatal Abstinence Syndrome County Report, available at https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/violence-injury-prevention-program/resources/NAS_Hospital_Reporting_in_Ohio.

[37] The federal program is described at: https://mchb.hrsa.gov/sites/default/files/mchb/MaternalChildHealthInitiatives/HomeVisiting/pdf/programbrief.pdf

58. Estimates of these costs are summarized in Appendix D, Tables C.6 and S.6.

7. Special Population: Jails

59. It is widely recognized that a substantial share of jail inmates have substance misuse problems.[38] The high OUD rates create challenges for the jail system: inmates going through detoxification require medical attention and additional staff care. However, currently both Cuyahoga and Summit County jails typically house such inmates within the general population. As a result, at times inmates need to be transported and housed in a hospital during this process at significant expense to the counties. And without sufficient resources to be able to start substance abuse treatment while inmates are in jail or to connect them effectively to treatment options upon release, the jails observe individuals committing opioid-related offenses soon after release and cycling back into jail.

60. The Abatement Plan would approximately double substance abuse treatments at Cuyahoga County's Bedford Heights and Euclid facilities and would add a detoxification unit at Cuyahoga County jail. Services also will be expanded in Summit County. Plans call for hiring additional social workers in Cuyahoga and Summit Counties to connect newly released inmates with OUD with treatment and transition services. Transitional housing also would be made available to a portion of inmates with OUD being released from prison.

61. Estimates of these abatement costs for the jails are summarized in Appendix D, Tables C.7 and S.7.

D. Overview of Harm Reduction Services Under the Abatement Plan

1. Naloxone

62. Naloxone is an opioid antagonist that has proven to be highly successful in reducing mortality when delivered to individuals experiencing an opioid-related overdose.[39] Naloxone is often administered by first responders, such as individuals from the divisions of Emergency Medical Services, Fire and Police. However, first responders may not arrive in time

[38] CUYAH_003505168 ("The CCCC currently provides housing and services for 26,000 inmates annually, the majority are inmates under a pre-trial status. Of this population, approximately 75% have a substance use disorder.)

[39] See National Institute on Drug Abuse, "Opioid Reversal with Naloxone (Narcan, Evzio)," revised April 2018, available at https://www.drugabuse.gov/related-topics/opioid-overdose-reversal-naloxone-narcan-evzio.

to administer naloxone and prevent a death. Indeed, the communities have already begun distributing naloxone kits to individuals through Project DAWN programs. I understand that Dr. Theodore Parran explains that fatalities from opioid-related overdoses would be reduced if naloxone kits were made more widely available to individuals with OUD, to their friends and family members, and if kits continue to be available to all first responders in the communities. He recommends that, on a community-wide basis, 3 to 9 doses (1.5 to 4.5 naloxone kits) be made available for each opioid-dependent individual, including individuals in treatment. Kits would be made available to the individuals, as well as their relatives and close friends.

63. Recognizing that not all individuals with OUD and their family and friends would take advantage of the plan, the Abatement Plan anticipates that two naloxone kits would be distributed in the community per year for each individual with OUD. These kits have a shelf life of two years and thus will need to be replaced regularly, even if not used. The Abatement Plan also provides for two public health employees in Cuyahoga County and one in Summit County to coordinate the logistics of the distribution program.

64. The Abatement Plan also continues to provide for sufficient naloxone availability for all first responders in the communities. In particular, based on 2017 purchasing data for the City of Cleveland the plan assumes that approximately 12,000 doses of naloxone will be purchased each year in Cuyahoga County and approximately 5,200 doses of naloxone will be purchased in Summit County, both to replace naloxone doses that have been used and those that have expired.

65. Appendix D Tables I, C.8 and S.8 reports estimates of Naloxone-related costs under the Abatement Plan.

2. Syringe Exchange Programs

66. Both communities operate needle exchange programs where intravenous drug users can exchange used needles for clean needles. Such programs have been shown to reduce infections with HIV and hepatitis C. In addition, these programs can counsel drug users on treatment options, encourage users to be tested for HIV and hepatitis C, and distribute fentanyl strips. The Abatement Plan would increase the number of syringe exchange locations in each community and expand the hours that they are open. Specifically, it would increase the needles exchanged in Cuyahoga County by 50 percent and the needles exchanged in Summit County by two-thirds.

67. Appendix D, Tables C.9 and S.9 report estimates of costs of the Syringe Exchange Program.

3. HIV/Hepatitis C Interventions

68. Intravenous use of heroin and other opioids is associated with an elevated risk of infection with HIV and hepatitis C.[40] Treating those infected with HIV and hepatitis C can reduce the harm to the individuals and reduce the spread of these diseases to others. The abatement plan includes resources for individuals who inject opioids to receive screening for HIV and hepatitis C, as well as resources to treat those whose HIV and hepatitis C was obtained from injection of opioids.

69. Estimates of these costs of HIV/Hepatitis C interventions are reported in Appendix D, Tables C.10 and S.10.

4. Social Support Housing

70. Research shows that unstable housing is associated with a higher risk of overdose death among those with substance use disorders.[41] The Abatement Plan proposes to provide two kinds of housing resources. The first is transitional housing for individuals with a history of opioid misuse being released from jail or prison.[42] The second is permanent supportive housing for homeless individuals with a history of opioid misuse.

71. Estimates of these social support housing costs under the Abatement Plan are reported in Appendix D, Tables C.11 and S.11.

E. Overview of Prevention Services Under the Abatement Plan

72. The primary prevention portion of the Abatement Plan aims to prevent individuals from becoming opioid users and misusers. It would allocate resources for a community-wide media campaign, for school-based prevention programs, for medical provider education and outreach, for drug disposal programs, and for law enforcement interventions. Each of these is briefly addressed in turn.

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[40] https://www.drugabuse.gov/publications/research-reports/heroin/why-are-heroin-users-special-risk-contracting-hivaids-hepatitis-b-c]

[41] For example, a Massachusetts Department of Health study found that the opioid-related death rate for individuals experiencing homelessness was 16 to 30 times greater than the rest of the population. (https://www.mass.gov/files/documents/2017/08/31/data-brief-chapter-55-aug-2017.pdf)

[42] This component is covered in the Special Populations: Jails cost category.

1. Media Campaigns

73. Media campaigns can play several important roles in combatting the opioid epidemic. First, they can educate individuals about the risks associated with prescription opioids so that they can make informed decisions about approaches to pain management. Second, they can educate individuals about the safe use of opioids, such as the benefits of keeping the duration of prescription opioid use as short as possible and of disposing of unused pills. Third, they can make individuals aware of specific resources available in their community such as drug disposal programs. Fourth, media campaigns can reduce the stigma associated with seeking treatment and also provide information to individuals about how to access treatment. The Abatement Plan provides resources to each community in line with prior successful public health media campaign's such as the FDA's "The Real Cost" media campaign to prevent youth from using tobacco.[43]

74. The cost estimates are provided in Appendix D Tables C.12 and S.12.

2. School-based Prevention Programs

75. The proposed school-based prevention program combines an evidence-based universal prevention effort with intensive referral and case-management effort for students showing early signs of being at risk for substance abuse.

76. Evidence-based school-wide programs such as LifeSkills Training (LST) and Project Towards No Drug Abuse (TND) have been shown to reduce adolescent substance use in multiple randomized trials demonstrating long-term effects.[44] In the abatement plan, I assume that programming is delivered to every student from sixth grade through twelfth grade – approximately 106,000 students in the Cuyahoga community and approximately 46,000 in the Summit community. Schools can also play an important role in identifying students who are showing early signs of being at risk for substance abuse and connecting those students to services. School districts such as New Haven have set up and staffed programs in which

[43] MacMonegle, Anna J., James Nonnemaker, Jennifer C. Duke, Matthew C. Farrelly, Xiaoquan Zhao, Janine C. Delahanty, Alexandria A. Smith, Pamela Rao and Jane A. Allen. "Cost-Effectiveness Analysis of The Real Cost Campaign's Effect on Smoking Prevention." *American Journal of Preventive Medicine* 55 no. 3 (2018): 319-325.

[44] Kris Glunt, "School-based Substance Abuse Prevention," EPISCenter, available at http://www.episcenter.psu.edu/sites/default/files/Presentations/SSC%20Presentation.pdf, pp. 8, 17-19, 26, 34.

educators within each school meet regularly to review the list of students who need services and then follow up to make sure the connections to services actually occur.[45] The abatement plan provides resources so that every high school and middle school in the Communities has a sufficient number of social workers to coordinate the school's efforts to connect at risk youth to services.

77. The cost estimates are provided in Appendix D, Tables C.13 and S.13.

3. Medical Provider Education and Outreach

78. Studies have found that medical system quality improvement efforts that educate providers about appropriate prescribing practices can significantly reduce opioid overprescribing. For example, a recent study of a coordinated effort by a medical system in Maryland found that a combination of provider education and accountability, enhanced oversight, tools to right-size postoperative discharge prescriptions, and reduction of default amount on standard opioid prescription orders resulted in a 58 percent decline in morphine milligram equivalents per clinical encounter.[46] The Abatement Plan would fund individuals to work with provider groups and medical systems to educate providers, address overprescribing, and spread best prescribing practices.

79. Estimates of the costs of the medical provider education and outreach programs are provided in Appendix D, Tables C.14 and S.14.

4. Drug Disposal Programs

80. Both communities have drug disposal programs including drug drop box sites and "take back your meds" events. The abatement plan provides resources to double the number of drop boxes installed as well as the number of events.

81. Estimates of these costs are provided in Appendix D, Tables C.15 and S.15.

5. Law Enforcement

82. In both Cleveland and Akron, police officials report that the opioid epidemic has required their departments to redeploy resources from other policing activities. In Cleveland, an

[45] https://www.newhavenct.gov/gov/depts/youth_services/stat.htm.

[46] Barry R. Meisenberg, MD; Jennifer Grover, PA; Colson Campbell, BS; Daniel Korpon, MS. Assessment of Opioid Prescribing Practices Before and After Implementation of a Health System Intervention to Reduce Opioid Overprescribing. JAMA Open Network, September 28, 2018.

entire unit that was previously dedicated to disrupting the activities of drug dealers, today is instead assigned to investigate drug overdose deaths.[47] In Akron, a two-person team investigates overdose deaths; the department notes that each requires an investigation with a similar level of detail as a homicide.[48] In Cleveland, police officials estimated that it would require an additional 20-25 officers to return to the level of service that was provided before the opioid epidemic and in Akron, at least two additional officers are needed to investigate overdose deaths.[49] The Abatement Plan provides additional staffing to community law enforcement agencies to investigate overdose deaths.

83. Additionally, both the city and county prosecutor's offices in the Communities have had to divert resources from prosecuting other crimes to prosecuting opioid related offenses. The Abatement Plan provides additional prosecutors to the community who can focus on prosecuting opioid-related crime.

84. Estimates of law enforcement costs are provided in Appendix D, Tables C.16 and S.16.

F. System Coordination

85. The Abatement Plan would dedicate a large amount of resources toward preventing and treating opioid addiction and avoiding and reducing the harms associated with improper opioid use. Achieving maximum impact will require effective coordination of the different pieces of the plan and of the different community partners responsible for implementing the different pieces. It will also require the ability to track progress and unmet needs using high-frequency data so as to reallocate resources to their highest value use as the nature of the epidemic evolves. Toward these ends, the Abatement Plan includes resources to system coordination.

1. Tracking Abatement Progress

86. In the Cuyahoga and Summit communities, the County Medical Examiners perform two important functions that are critical to the communities' ability to track and quickly respond to changing patterns of opioid use. First, they perform autopsies that can determine

[47] Deposition of Gary Gingell, November 20, 2018, pp. 237, 175-176.

[48] See AKRON_001121744 and AKRON_001121745

[49] See Deposition of Gary Gingell, November 20, 2018, pp. 243-244; AKRON_001121745.

what substances were responsible for overdose deaths. Second, they test drugs seized by police to determine what the substances are. The rise in overdose deaths and in the need for testing of drugs has resulted in an unsustainable work load for the medical examiner offices. The Abatement Plan would add staff to the Cuyahoga medical examiner's office and the Summit medical examiner's office.

87. Estimated costs of tracking the abatement progress are presented in Appendix D, Tables C.17 and S.17.

2. Court System Resources

88. The court systems in each community perform important roles in connecting individuals to treatment services. However, there are often several-week delays between when referrals to services are made and when assessments occur and then further delays before treatment can begin.[50] The Abatement Plan provides each community's court system with additional staff members who would 1) keep judges up to date on treatment options in the community; 2) track the docket of individuals who have been referred to drug treatment services to measure how quickly connections to services are being made; 3) intervene with service providers to reduce treatment delays; and 4) represent the court system in the abatement initiative systems re-engineering processes.

89. Estimated costs of additional court system resources are presented in Appendix D, Tables C.18 and S.18.

3. Data Informed Systems Re-Engineering and Management

90. The Abatement Plan would provide each community with funding to set up a team to coordinate the overall effort and to work with the multitude of government agencies, medical institutions, and service providers to troubleshoot problems, develop continuous improvement efforts, and identify opportunities to re-engineer how individuals are connected to services to reduce the number of people who fall through the cracks. The team would be responsible for establishing high frequency (weekly and monthly) metrics for tracking the progress and efficacy of the Abatement Plan and for convening relevant stakeholders to

[50] Summit County, Sequential Intercept Mapping and Action Planning for Opioid Epidemic Response, March 20, 2019 (SUMMIT_000349556), at p. 15; Comment by D. Skoda at Roundtable Meeting with Summit County Community Members, July 11, 2018.

collaboratively review the metrics and determine how to take action so as to maximize the number of residents who receive needed treatment, minimize the harms associated with opioid use, and reduce the flow of new individuals who use or become addicted to opioids. The abatement Plan envisions a five-person team in each community made up of an executive director, two program managers, one data analyst, and one staff assistant.

91. Estimates of these costs are summarized in Appendix D, Tables C.19 and S.19.

VII. ESTIMATED COST OF ABATEMENT PLAN

92. Tables 1 and 2 summarize the costs of the Abatement Plan for the programs evaluated to date for Cuyahoga and Summit, respectively. These costs include both the costs of continuing current efforts to abate the opioid epidemic and the additional costs associated with the expansion in services envisioned in the Plan.

93. It is anticipated that it will take four years to phase in the plan, with costs rising in each year from 2020 through 2023. To illustrate the annual cost of the plan once fully implemented, the first column shows the annual cost in year 5 of the plan (2024). Annual costs for the elements of the Abatement Plan evaluated to date are estimated to be $312 million in Cuyahoga and $137 million in Summit in 2024.[51]

94. The base case reflects the Experts' view that 2024 level of treatment will be needed for at least another 10 years after that date. I understand that the Expert Report of Anna Lembke explains that the current and future stock of people who have experienced OUD will lead to recurring treatment needs in the future both because some individuals will need to receive treatment for many years and because others will relapse and require renewed treatment. Thus,

[51] Annual costs for each year from 2020 through 2034 are provided in the accompanying detailed tables.

any decline in treatment needs from a decline in new OUD cases will be offset by greater needs associated with the growing stock of people with continuing treatment needs.[52]

Table 1
Summary of Abatement Costs, Cuyahoga County

	$ in millions	Annual Cost: Year 5 (2024)	15-Year Estimate: 2020-2034 Low	Base	High	Report Section	App D Table
	TREATMENT						
[1]	Treatment (Excl. MAT)	$184.2	$2,595.0	$3,003.4	$3,411.7	VI.C.1	Table C.1
[2]	Medication-Assisted Treatment (MAT)	$40.3	$513.6	$594.0	$674.5	VI.C.2	Table C.2
[3]	Recruiting PCPs to Provide MAT	$0.5	$9.0	$9.0	$9.0	VI.C.3	Table C.3
[4]	Connecting Individuals to Services	$5.8	$92.0	$94.5	$97.1	VI.C.4	Table C.4
[5]	Special Populations: Child Welfare	$17.6	$288.6	$288.6	$288.6	VI.C.5	Table C.5
[6]	Special Populations: Pregnant Women	$1.7	$29.2	$29.2	$29.2	VI.C.6	Table C.6
[7]	Special Populations: Jails	$13.7	$222.0	$222.0	$222.0	VI.C.7	Table C.7
	HARM REDUCTION						
[8]	Naloxone	$5.0	$78.5	$85.2	$91.9	VI.D.1	Table C.8
[9]	Syringe Exchange Programs	$0.7	$10.9	$11.3	$11.8	VI.D.2	Table C.9
[10]	HIV/Hep C Interventions	$13.8	$205.9	$205.9	$205.9	VI.D.3	Table C.10
[11]	Social Support Housing	$4.8	$77.0	$77.0	$77.0	VI.D.4	Table C.11
	PREVENTION						
[12]	Media Campaign	$1.2	$18.5	$18.5	$18.5	VI.E.1	Table C.12
[13]	School-Based Prevention	$16.1	$264.0	$264.0	$264.0	VI.E.2	Table C.13
[14]	Medical Provider Education	$0.4	$6.3	$6.3	$6.3	VI.E.3	Table C.14
[15]	Drug Disposal Programs	$0.4	$6.1	$6.1	$6.1	VI.E.4	Table C.15
[16]	Law Enforcement Interventions	$4.5	$74.5	$74.5	$74.5	VI.E.5	Table C.16
	SYSTEM COORDINATION						
[17]	Tracking Abatement Progress	$0.4	$6.7	$6.7	$6.7	VI.F.1	Table C.17
[18]	Court System Resources	$0.3	$5.0	$5.0	$5.0	VI.F.2	Table C.18
[19]	Data-Informed Systems Re-Engineering & Mgmt	$0.8	$13.9	$13.9	$13.9	VI.F.3	Table C.19
	ABATEMENT COST, TOTAL	$312.2	$4,516.6	$5,015.2	$5,513.7		

Table 2
Summary of Abatement Costs, Summit County

	$ in millions	Annual Cost: Year 5 (2024)	15-Year Estimate: 2020-2034 Low	Base	High	Report Section	App D Table
	TREATMENT						
[1]	Treatment (Excl. MAT)	$80.5	$1,136.1	$1,313.1	$1,490.1	VI.C.1	Table S.1
[2]	Medication-Assisted Treatment (MAT)	$17.5	$222.7	$257.5	$292.4	VI.C.2	Table S.2
[3]	Recruiting PCPs to Provide MAT	$0.3	$4.5	$4.5	$4.5	VI.C.3	Table S.3
[4]	Connecting Individuals to Services	$2.9	$45.8	$47.0	$48.2	VI.C.4	Table S.4
[5]	Special Populations: Child Welfare	$13.2	$216.8	$216.8	$216.8	VI.C.5	Table S.5
[6]	Special Populations: Pregnant Women	$0.9	$15.1	$15.1	$15.1	VI.C.6	Table S.6
[7]	Special Populations: Jails	$5.2	$84.0	$84.0	$84.0	VI.C.7	Table S.7
	HARM REDUCTION						
[8]	Naloxone	$2.3	$36.2	$39.1	$42.0	VI.D.1	Table S.8
[9]	Syringe Exchange Programs	$0.5	$7.1	$7.4	$7.7	VI.D.2	Table S.9
[10]	HIV/Hep C Interventions	$2.7	$40.2	$40.2	$40.2	VI.D.3	Table S.10
[11]	Social Support Housing	$1.5	$24.0	$24.0	$24.0	VI.D.4	Table S.11
	PREVENTION						
[12]	Media Campaign	$0.5	$8.1	$8.1	$8.1	VI.E.1	Table S.12
[13]	School-Based Prevention	$7.0	$114.0	$114.0	$114.0	VI.E.2	Table S.13
[14]	Medical Provider Education	$0.1	$1.8	$1.8	$1.8	VI.E.3	Table S.14
[15]	Drug Disposal Programs	$0.2	$3.7	$3.7	$3.7	VI.E.4	Table S.15
[16]	Law Enforcement Interventions	$0.9	$14.6	$14.6	$14.6	VI.E.5	Table S.16
	SYSTEM COORDINATION						
[17]	Tracking Abatement Progress	$0.2	$3.2	$3.2	$3.2	VI.F.1	Table S.17
[18]	Court System Resources	$0.3	$5.0	$5.0	$5.0	VI.F.2	Table S.18
[19]	Data-Informed Systems Re-Engineering & Mgmt	$0.8	$13.9	$13.9	$13.9	VI.F.3	Table S.19
	ABATEMENT COST, TOTAL	$137.4	$1,996.9	$2,213.2	$2,429.4		

95. There is, however, uncertainty about the extent of future treatment needs. For example, the Abatement Plan assumes that 1.4 percent of the adult population in each community has opioid use disorder, based on an estimate reported by Pitt et al. Pitt et al. adjust NSDUH estimate of the OUD population upward by roughly 70 percent to correct for underreporting and for populations like the homeless and incarcerated who are not included in the NSDUH sampling frame.[53] This adjustment may be conservative based on a 2018

[52] The resource needs for some components of the Abatement Plan are assumed to decline over time. For example, as more individuals receive MAT, the plan envisions a decline in overdoses and reduced need to replace first responder supplies of naloxone.

[53] Pitt, Allison L., Keith Humphreys and Margaret L. Brandeau. "Modeling Health Benefits and Harms of Public Policy Responses to the US Opioid Epidemic." AJPH Open Themed Research Vol. 108 no. 10 (Oct 2018): 1394-1400, at Supplement pp. S3-S4.

Massachusetts study which estimates that the number of people with OUD could be more than four times the NSDUH estimate.[54] Moreover, it eventually may be possible to recruit more than 40 percent of the OUD population into treatment. For both of these reasons, treatment costs could be higher than in the base case. Alternatively, it is possible that changes in prescribing practices and other prevention efforts will reduce the flow of new OUD cases faster than currently anticipated and that treatment costs will therefore be lower than in the base case.

96. To illustrate the sensitivity of the base case estimates to alternative assumptions about future treatment needs, Tables 1 and 2 present "high" and "low" estimates in addition to the base case.[55] The high estimate assumes that treatment needs increase over ten years to 1.33 times the 2024 level. The low estimate assumes treatment needs decline over ten years to two-thirds of the 2024 level. In Cuyahoga, the 15-year costs for the elements of the Abatement Plan evaluated to date range from $4.5 billion to $5.5 billion. In Summit, the 15-year costs range from $2.0 billion to $2.4 billion.

97. The Abatement Plan described in this report reflects the information available to me at the time of its writing and my best judgment about the needs in the two communities. When it becomes time to implement the actual Plan, it will be important to update the Plan based upon the latest information and conditions on the ground in Cuyahoga and Summit and to have a more intensive process of engaging community members and local experts so as to ensure the most effective possible implementation of the Abatement Plan for the Cuyahoga and Summit Communities.

[54] Barocas, et al, "Estimated Prevalence of Opioid Use Disorder in Massachusetts, 2011-2015: A Capture-Recapture Analysis." American Journal of Public Health, 2018, 108:12, 1675-1681.

[55] In addition to the treatment variations described here, low and high case estimates are also presented in Tables C.8 and S.8 (naloxone) and C.9 and S.9 (syringe exchange programs).

April 3, 2019

Jeffrey B. Liebman

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Jeffrey B. Liebman

Table C.0
OUD Population in Year 1, Cuyahoga County

[1]	OUD Rate	1.4%
[2]	Cuyahoga County population 12+, 2017	1,077,588
[3]	OUD population, Year 1	15,167
[4]	% OUD population receiving treatment	20.0%
[5]	OUD population receiving treatment, Year 1	3,033
[6]	MAT % of OUD treatment	33.3%
[7]	OUD population receiving MAT, Year 1	1,011

Sources and Notes:

[1]=0.77% OUD prevalence + 0.63% HUD prevalence. See Pitt AL, Humphreys K, and Brandeau ML (2018), Supplement at S4 and Table A. 0.63% HUD prevalence = 0.51% HUD after OUD prevalence / 80% of HUD individuals with OUD first.

[2]: National Center for Health Statistics, Bridged-Race Population Estimates, July 1st resident population age 12 or older, Cuyahoga County.

[3]=[1]*[2].

[4], [6]: Based on available data on treatment received by the population with OUD. See e.g., SAMHSA/HHS: An Update on the Opioid Crisis, March 14, 2018 at p. 2 ("Only 20% with OUD received specialty addiction treatment"); Emma Sandoe, Carrie E. Fry and Richard G. Frank, “Policy Levers That States Can Use to Improve Opioid Addiction Treatment and Address the Opioid Epidemic,” Health Affairs, October 2, 2018 ("[F]ewer than 10 percent of those with an OUD receive MAT").

[5]=[3]*[4].

[7]=[5]*[6].

Table S.0
OUD Population in Year 1, Summit County

[1]	OUD Rate	1.4%
[2]	Summit County population 12+, 2017	467,186
[3]	OUD population, Year 1	6,576
[4]	% OUD population receiving treatment	20.0%
[5]	OUD population receiving treatment, Year 1	1,315
[6]	MAT % of OUD treatment	33.3%
[7]	OUD population receiving MAT, Year 1	438

Sources and Notes:

[1]=0.77% OUD prevalence + 0.63% HUD prevalence. See Pitt AL, Humphreys K, and Brandeau ML (2018), Supplement at S4 and Table A. 0.63% HUD prevalence = 0.51% HUD after OUD prevalence / 80% of HUD individuals with OUD first.

[2]: National Center for Health Statistics, Bridged-Race Population Estimates, July 1st resident population age 12 or older, Summit County.

[3]=[1]*[2].

[4], [6]: Based on available data on treatment received by the population with OUD. See e.g., SAMHSA/HHS: An Update on the Opioid Crisis, March 14, 2018 at p. 2 ("Only 20% with OUD received specialty addiction treatment"); Emma Sandoe, Carrie E. Fry and Richard G. Frank, “Policy Levers That States Can Use to Improve Opioid Addiction Treatment and Address the Opioid Epidemic,” Health Affairs, October 2, 2018 ("[F]ewer than 10 percent of those with an OUD receive MAT").

[5]=[3]*[4].

[7]=[5]*[6].

Table C.1

Estimated Cost of Treatment, Cuyahoga County

			Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024	Year 6 2025	Year 7 2026	Year 8 2027	Year 9 2028	Year 10 2029	Year 11 2030	Year 12 2031	Year 13 2032	Year 14 2033	Year 15 2034
	Projected population receiving treatment																
[1]	Population receiving treatment, low case		3,033	4,045	5,056	6,067	6,067	6,067	5,842	5,617	5,393	5,168	4,943	4,719	4,494	4,269	4,045
[2]	Population receiving treatment, base case		3,033	4,045	5,056	6,067	6,067	6,067	6,067	6,067	6,067	6,067	6,067	6,067	6,067	6,067	6,067
[3]	Population receiving treatment, high case		3,033	4,045	5,056	6,067	6,067	6,067	6,292	6,516	6,741	6,966	7,190	7,415	7,640	7,864	8,089
	Estimated cost of treatment	*2019$ [A]*															
[4]	Average cost of treatment provided	$24,023 / person	$25,126	$26,279	$27,439	$28,650	$29,864	$31,077	$32,339	$33,652	$35,018	$36,502	$38,048	$39,660	$41,341	$43,092	$44,918
	Specialized facility for families	*2019$ [B]*															
[5]	# of residential units required	75															
[6]	Housing cost per unit	$10,032															
[7]	Childcare cost per unit	$9,541															
[8]	Resident costs ($000s)	$1,468															
[9]	Other operating costs ($000s)	$1,165															
[10]	Cost of facility ($000s)	$2,633	$2,702	$2,772	$2,841	$2,912	$2,982	$3,051	$3,121	$3,193	$3,266	$3,345	$3,425	$3,507	$3,591	$3,678	$3,766
	Total cost of treatment	*2020-2034 [C]*															
[11]	Low case ($000s)	$2,595,019	$78,920	$109,060	$141,565	$176,728	$184,163	$191,588	$192,047	$192,228	$192,109	$191,987	$191,510	$190,650	$189,374	$187,649	$185,439
[12]	Base case ($000s)	$3,003,359	$78,920	$109,060	$141,565	$176,728	$184,163	$191,588	$199,313	$207,351	$215,714	$224,794	$234,257	$244,120	$254,398	$265,111	$276,276
[13]	High case ($000s)	$3,411,700	$78,920	$109,060	$141,565	$176,728	$184,163	$191,588	$206,580	$222,474	$239,320	$257,601	$277,004	$297,589	$319,422	$342,573	$367,113

Sources and Notes:

See Table I for actual and projected inflation rates used.

[A]: Cost estimated based on Dr. Parran's description of treatment needs (Parran Report at pp. 127, 136-137) and a study of the economic costs of substance abuse treatments (Alexandre PK, Beulaygue IC, French MT et al. (2012)).

[C]=Σ(Year 1 to Year 15).

[1]-[3]: Year 1 from Table C.0[5]. Projects that the number of individuals receiving treatment doubles by Year 4. Base case projects the number of individuals receiving treatment remains constant thereafter. Low case projects that the number of individuals receiving treatment will decline by 1/3 from Year 5 to Year 15. High case projects that the number of individuals receiving treatment will increase by 1/3 from Year 5 to Year 15.

[4]: Estimated cost based on [A] and medical care services inflation.

[5]: Double the capacity of Miracle Village, which was a 30-unit apartment building for mothers receiving intensive treatment.

[6]: Based on HUD fair market rent in 2019 for a 2-bedroom residence in Cuyahoga County.

[7]: Average cost of infant childcare in Ohio, as reported by the Economic Policy Institute.

[8]=[5]*([6]+[7])/10^3.

[9]: Based on the (inflation-adjusted) expenditures of Tarry House, a program in Summit County that provided residential recovery/treatment, respite housing, supported housing and community psychiatric and supportive treatment (CPST) and counseling services to nearly 250 different people in 2017.

[10]: [10B]=[8]+[9]. Year 1 onward grown at projected inflation.

[11]=([1]*[4])/10^3+[10].

[12]=([2]*[4])/10^3+[10].

[13]=([3]*[4])/10^3+[10].

Table S.1

Estimated Cost of Treatment, Summit County

			Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024	Year 6 2025	Year 7 2026	Year 8 2027	Year 9 2028	Year 10 2029	Year 11 2030	Year 12 2031	Year 13 2032	Year 14 2033	Year 15 2034
	Projected population receiving treatment																
[1]	Population receiving treatment, low case		1,315	1,754	2,192	2,630	2,630	2,630	2,533	2,435	2,338	2,241	2,143	2,046	1,948	1,851	1,754
[2]	Population receiving treatment, base case		1,315	1,754	2,192	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630
[3]	Population receiving treatment, high case		1,315	1,754	2,192	2,630	2,630	2,630	2,728	2,825	2,923	3,020	3,117	3,215	3,312	3,410	3,507
	Estimated cost of treatment	*2019$ [A]*															
[4]	Average cost of treatment provided	$24,023 / person	$25,126	$26,279	$27,439	$28,650	$29,864	$31,077	$32,339	$33,652	$35,018	$36,502	$38,048	$39,660	$41,341	$43,092	$44,918
	Specialized facility for families	*2019$ [B]*															
[5]	# of residential units required	30															
[6]	Housing cost per unit	$9,720															
[7]	Childcare cost per unit	$9,541															
[8]	Resident costs ($000s)	$578															
[9]	Other operating costs ($000s)	$1,165															
[10]	Cost of facility ($000s)	$1,743	$1,789	$1,835	$1,881	$1,928	$1,974	$2,020	$2,066	$2,114	$2,162	$2,214	$2,267	$2,322	$2,377	$2,434	$2,493
	Total cost of treatment	*2020-2034 [C]*															
[11]	Low case ($000s)	$1,136,064	$34,833	$47,916	$62,024	$77,285	$80,525	$83,759	$83,975	$84,070	$84,035	$84,000	$83,811	$83,457	$82,923	$82,195	$81,257
[12]	Base case ($000s)	$1,313,100	$34,833	$47,916	$62,024	$77,285	$80,525	$83,759	$87,125	$90,626	$94,269	$98,223	$102,344	$106,639	$111,114	$115,778	$120,639
[13]	High case ($000s)	$1,490,135	$34,833	$47,916	$62,024	$77,285	$80,525	$83,759	$90,275	$97,183	$104,503	$112,447	$120,877	$129,820	$139,305	$149,362	$160,021

Sources and Notes:

See Table I for actual and projected inflation rates used.

[A]: Cost estimated based on Dr. Parran's description of treatment needs (Parran Report at pp. 127, 136-137) and a study of the economic costs of substance abuse treatments (Alexandre PK, Beulaygue IC, French MT et al. (2012)).

[C]=Σ(Year 1 to Year 15).

[1]-[3]: Year 1 from Table S.0[5]. Projects that the number of individuals receiving treatment doubles by Year 4. Base case projects the number of individuals receiving treatment remains constant thereafter. Low case projects that the number of individuals receiving treatment will decline by 1/3 from Year 5 to Year 15. High case projects that the number of individuals receiving treatment will increase by 1/3 from Year 5 to Year 15.

[4]: Estimated cost based on [A] and medical care services inflation.

[5]: Based on the capacity of Miracle Village, which was a 30-unit apartment building for mothers receiving intensive treatment.

[6]: Based on HUD fair market rent in 2019 for a 2-bedroom residence in Summit County.

[7]: Average cost of infant childcare in Ohio, as reported by the Economic Policy Institute.

[8]=[5]*([6]+[7])/10^3.

[9]: Based on the (inflation-adjusted) expenditures of Tarry House, a program in Summit County that provided residential recovery/treatment, respite housing, supported housing and community psychiatric and supportive treatment (CPST) and counseling services to nearly 250 different people in 2017.

[10]: [10B]=[8]+[9]. Year 1 onward grown at projected inflation.

[11]=([1]*[4])/10^3+[10].

[12]=([2]*[4])/10^3+[10].

[13]=([3]*[4])/10^3+[10].

Table C.2

Estimated Cost of MAT, Cuyahoga County

			Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024	Year 6 2025	Year 7 2026	Year 8 2027	Year 9 2028	Year 10 2029	Year 11 2030	Year 12 2031	Year 13 2032	Year 14 2033	Year 15 2034
[1]	MAT % of population receiving treatment		33.3%	44.4%	55.6%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
	Projected population receiving MAT																
[2]	Population receiving MAT, low case		1,011	1,798	2,809	4,045	4,045	4,045	3,895	3,745	3,595	3,445	3,296	3,146	2,996	2,846	2,696
[3]	Population receiving MAT, base case		1,011	1,798	2,809	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045	4,045
[4]	Population receiving MAT, high case		1,011	1,798	2,809	4,045	4,045	4,045	4,194	4,344	4,494	4,644	4,794	4,943	5,093	5,243	5,393
	Estimated cost of MAT	*2019$ [A]*															
[5]	Buprenorphine	$122 / week	$6,675	$7,011	$7,350	$7,705	$8,062	$8,421	$8,795	$9,186	$9,595	$10,040	$10,506	$10,993	$11,504	$12,037	$12,596
[6]	Methadone	$134 / week	$7,314	$7,681	$8,053	$8,442	$8,833	$9,226	$9,637	$10,065	$10,513	$11,000	$11,511	$12,045	$12,604	$13,189	$13,801
[7]	Naltrexone (VIVITROL®)	$1,251 / month	$15,766	$16,558	$17,359	$18,198	$19,042	$19,889	$20,773	$21,697	$22,662	$11,620	$11,429	$10,883	$11,388	$11,797	$11,110
[8]	Average annual cost of MAT		$7,935	$8,416	$8,909	$9,430	$9,962	$10,503	$10,971	$11,458	$11,968	$10,709	$11,097	$11,450	$11,981	$12,519	$12,915
	Allocation of MAT	*% of MAT [B]*															
[9]	Buprenorphine	35.0%	35.0%	36.0%	37.0%	38.0%	39.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
[10]	Methadone	55.0%	55.0%	53.0%	51.0%	49.0%	47.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
[11]	Naltrexone (VIVITROL®)	10.0%	10.0%	11.0%	12.0%	13.0%	14.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
	Total cost of MAT	*2020-2034 [C]*															
[12]	Low case ($000s)	$513,592	$8,024	$15,129	$25,023	$38,140	$40,291	$42,482	$42,727	$42,911	$43,026	$36,897	$36,570	$36,019	$35,896	$35,632	$34,824
[13]	Base case ($000s)	$594,044	$8,024	$15,129	$25,023	$38,140	$40,291	$42,482	$44,371	$46,344	$48,405	$43,314	$44,881	$46,310	$48,459	$50,636	$52,236
[14]	High case ($000s)	$674,497	$8,024	$15,129	$25,023	$38,140	$40,291	$42,482	$46,014	$49,777	$53,783	$49,730	$53,192	$56,602	$61,023	$65,639	$69,648

Sources and Notes:

See Table I for actual and projected inflation rates used.

[A]: U.S. DOD, Office of the Secretary. 32 CFR Part 199. TRICARE; Mental Health and Substance Use Disorder Treatment. Federal Register, Vol. 81, No. 171, 61068-61098. Adjusted for prescription drug price inflation.

[B]: OhioMHAS estimates that the breakdown of MAT received by clients in Ohio's opioid-treatment programs (OTPs) is 74.2% methadone, 21.5% buprenorphine, and 4.3% naltrexone. This estimate is adjusted to reflect buprenorphine and naltrexone provided via non-OTP treatment facilities, based on data from the National Survey of Substance Abuse Treatment Services, 2017.

[C]=Σ(Year 1 to Year 15).

[1]: Projects that the prevalence of MAT among individuals receiving treatment will double by Year 4 and remain constant thereafter.

[2]=[1]*Table C.1[1].

[3]=[1]*Table C.1[2].

[4]=[1]*Table C.1[3].

[5]-[7]: Annual cost of treatment based on [B] and projected prescription drug price inflation. Naltrexone price drops in 2029 when the drug goes off-patent based on generic pricing trends reported by IMS.

[8]=[5]*[9]+[6]*[10]+[7]*[11].

[9]-[11]: Projects that buprenorphine and naltrexone allocation will increase gradually through Year 6 as the # of PCPs providing MAT increases.

[12]=([2]*[8])/10^3.

[13]=([3]*[8])/10^3.

[14]=([4]*[8])/10^3.

CONFIDENTIAL **APPENDIX D**

Table S.2

Estimated Cost of MAT, Summit County

			Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024	Year 6 2025	Year 7 2026	Year 8 2027	Year 9 2028	Year 10 2029	Year 11 2030	Year 12 2031	Year 13 2032	Year 14 2033	Year 15 2034
[1]	MAT % of population receiving treatment		33.3%	44.4%	55.6%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%	66.7%
	Projected population receiving MAT																
[2]	Population receiving MAT, low case		438	779	1,218	1,754	1,754	1,754	1,689	1,624	1,559	1,494	1,429	1,364	1,299	1,234	1,169
[3]	Population receiving MAT, base case		438	779	1,218	1,754	1,754	1,754	1,754	1,754	1,754	1,754	1,754	1,754	1,754	1,754	1,754
[4]	Population receiving MAT, high case		438	779	1,218	1,754	1,754	1,754	1,818	1,883	1,948	2,013	2,078	2,143	2,208	2,273	2,338
	Estimated cost of MAT	*2019$ [A]*															
[5]	Buprenorphine	$122 / week	$6,675	$7,011	$7,350	$7,705	$8,062	$8,421	$8,795	$9,186	$9,595	$10,040	$10,506	$10,993	$11,504	$12,037	$12,596
[6]	Methadone	$134 / week	$7,314	$7,681	$8,053	$8,442	$8,833	$9,226	$9,637	$10,065	$10,513	$11,000	$11,511	$12,045	$12,604	$13,189	$13,801
[7]	Naltrexone (VIVITROL®)	$1,251 / month	$15,766	$16,558	$17,359	$18,198	$19,042	$19,889	$20,773	$21,697	$22,662	$11,620	$11,429	$10,883	$11,388	$11,797	$11,110
[8]	Average annual cost of MAT		$7,935	$8,416	$8,909	$9,430	$9,962	$10,503	$10,971	$11,458	$11,968	$10,709	$11,097	$11,450	$11,981	$12,519	$12,915
	Allocation of MAT	*% of MAT [B]*															
[9]	Buprenorphine	35.0%	35.0%	36.0%	37.0%	38.0%	39.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
[10]	Methadone	55.0%	55.0%	53.0%	51.0%	49.0%	47.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
[11]	Naltrexone (VIVITROL®)	10.0%	10.0%	11.0%	12.0%	13.0%	14.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
	Total cost of MAT	*2020-2034 [C]*															
[12]	Low case ($000s)	$222,667	$3,479	$6,559	$10,849	$16,535	$17,468	$18,418	$18,524	$18,604	$18,654	$15,997	$15,855	$15,616	$15,563	$15,448	$15,098
[13]	Base case ($000s)	$257,547	$3,479	$6,559	$10,849	$16,535	$17,468	$18,418	$19,237	$20,092	$20,986	$18,779	$19,458	$20,078	$21,009	$21,953	$22,647
[14]	High case ($000s)	$292,427	$3,479	$6,559	$10,849	$16,535	$17,468	$18,418	$19,949	$21,581	$23,318	$21,561	$23,061	$24,540	$26,456	$28,458	$30,196

Sources and Notes:

See Table I for actual and projected inflation rates used.

[A]: U.S. DOD, Office of the Secretary. 32 CFR Part 199. TRICARE; Mental Health and Substance Use Disorder Treatment. Federal Register, Vol. 81, No. 171, 61068-61098. Adjusted for prescription drug price inflation.

[B]: OhioMHAS estimates that the breakdown of MAT received by clients in Ohio's opioid-treatment programs (OTPs) is 74.2% methadone, 21.5% buprenorphine, and 4.3% naltrexone. This estimate is adjusted to reflect buprenorphine and naltrexone provided via non-OTP treatment facilities, based on data from the National Survey of Substance Abuse Treatment Services, 2017.

[C]=Σ(Year 1 to Year 15).

[1]: Projects that the prevalence of MAT among individuals receiving treatment will double by Year 4 and remain constant thereafter.

[2]=[1]*Table S.1[1].

[3]=[1]*Table S.1[2].

[4]=[1]*Table S.1[3].

[5]-[7]: Annual cost of treatment based on [B] and projected prescription drug price inflation. Naltrexone price drops in 2029 when the drug goes off-patent based on generic pricing trends reported by IMS.

[8]=[5]*[9]+[6]*[10]+[7]*[11].

[9]-[11]: Projects that buprenorphine and naltrexone allocation will increase gradually through Year 6 as the # of PCPs providing MAT increases.

[12]=([2]*[8])/10^3.

[13]=([3]*[8])/10^3.

[14]=([4]*[8])/10^3.